Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: 151906 Date: 08-12-2014

Subject Name: Conventional Power Engineering

Time: 10.30 am - 01.00 pm Total Marks: 70

Instructions:

1. **Attempt all questions**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Draw a General layout of a thermal power plant and discuss the various circuits. Also explain the working of steam power plant. **07**

(b) State the various methods of improving the efficiency and work output of a gas turbine plant. With schematic and T-S diagram explain the regeneration process. **07**

Q.2 **(a)** A gas turbine operates on Brayton cycle. The temperature range is 877^0C and 15^0C. Find pressure ratio for maximum power output. Also determine thermal efficiency, work ratio and power output, if the mass flow rate of air is 20 kg/sec. Take Cp = 1.005 kj/kg and Gama =1.4 for compression and expansion process. **07**

(b) Explain the process in simple Rankine Cycle on p-v and T-S diagrams and derive an expression for thermal efficiency. Name the significant parameters to improve thermal efficiency of the power plant. **07**

OR

(b) Derive an equation maximum blade efficiency for single stage Impulse turbine. And hence derive the equation for maximum power output per kg of steam. **07**

Q.3 **(a)** With a neat sketch draw an outline diagram of a diesel power plant and state the functions of different systems. **07**

(b) Define "degree of reaction" of steam turbine. Derive an expression for calculating degree of reaction in terms of velocities. Give a brief comparison of impulse and reaction turbines? **07**

OR

Q.3 **(a)** State the various methods of governing of steam turbines. Explain nozzle control Governing with neat sketch & Compare with the Throttle governing. **07**

(b) State the requirement of a fuel injection systems in a Diesel engine and explain with neat sketch Common rail fuel injection system. **07**

Q.4 **(a)** Write advantages and disadvantages of Hydraulic power plant Also write the classification for hydraulic turbines. **07**

(b) Describe CANDU type nuclear reactor with help of neat sketch .Give names of various nuclear fuels used in nuclear power plants. **07**

OR

Q.4 **(a)** Differentiate between Nuclear fission and fusion process. Explain Nuclear fission and chain reaction. **07**

(b) What is axial flow turbine? Explain construction and working of Kaplan turbine and compare with the Francis Turbine. **07**

Q.5 **(a)** Define load factor, Diversity factor and plant use factor. A thermal power plant consists of two units of 30 MW each running for 8200 hours and one unit of 10 MW running for 2000 hours in a year. The energy produced by the plant 400 x 10^6 kWh per annum. Determine the plant load factor and plant use factor. The maximum demand is equal to the plant capacity. **07**

(b) What is present status of power generation in India? Explain the difference in working of three different types of Hydro turbines ? **07**

OR

Q.5	**(a)**	Describe the significance of load curves in planning and determining the size of Units in power plants. Define base load, Intermediate load and peak loads, with load curves.	**07**
	(b)	List various nuclear power plants in India. Explain in detail Nuclear waste and its disposal.	**07**

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